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WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036

EXAMINER	
TALBOT, BRIAN K	

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The time period for reply, if any, is set in the attached communication.

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SHOJI HARA,
TAKASHI ITOH, HITOSHI NOJIRI, and
MASARU NISHINAKA

Appeal 2009-003197
Application 09/782,169
Technology Center 1700

Heard: 25 June 2009
Decided:[1] July 14, 2009

Before JEFFREY T. SMITH, MARK NAGUMO, and
MICHAEL P. COLAIANNI, *Administrative Patent Judges*.

NAGUMO, *Administrative Patent Judge*.

DECISION ON APPEAL

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[1] The two-month time period for filing an appeal or commencing a civil action, as recited in 37 C.F.R. § 1.304, begins to run from the Decided Date shown on this page of the decision. The time period does not run from the Mail Date (paper delivery) or Notification Date (electronic delivery).

A. Introduction[2]

Shoji Hara, Takashi Itoh, Hitoshi Nojiri, and Masaru Nishinaka ("Hara") timely appeal under 35 U.S.C. § 134(a) from the final rejection[3] of claims 1-13 and 17-20. We have jurisdiction under 35 U.S.C. § 6. We REVERSE.

The subject matter on appeal relates to methods for adhering conductor layers to polyimide films. The laminated products are said to be useful for electronic circuit substrates. One prior art method, mechanically roughening the substrate to increase the contact surface area, is said to lead to projections and defects in the metallized layer. Another prior art method, applying an undercoating layer, e.g., of chromium, prior to formation of the conductor layer, is said to lead to undercutting or short-circuiting problems due to differences in etching rates. The claimed methods are said to achieve improved adhesion strength without roughing or applying an adhesive metal undercoating layer.

Representative Claim 1 is reproduced from the Claims Appendix to the Principal Brief on Appeal:

> 1. A process for producing a laminate comprising a polyimide and a conductor layer, which comprises

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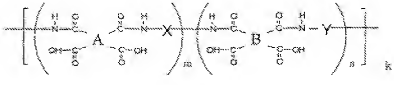
[2] Application 09/782,169, *Laminate Comprising Polyimide and Conductor Layer, Multi-Layer Wiring Board with the Use of the Same and Process for Producing the Same*, filed 14 February 2001, claiming the benefit of Japanese Patent Applications filed 14 February 2000 and 3 August 2000. The specification is referred to as the "169 Specification," and is cited as "Spec." The real party in interest is listed as Kaneka Corporation. (Appeal Brief for the Appellant, filed 9 April 2008 ("Br."), 1.)

[3] Office action mailed 15 February 2007 ("Final Rejection"; cited as "FR").

> forming at least one conductor layer directly adhering with at least one surface of a thermoplastic polyimide film to obtain a laminate, and
>
> heating said laminate after said laminate is formed so that the adhesion strength between the thermoplastic polyimide film and the conductor layer is enhanced.

(Claims App., Br. 28; indentation added.)

The conductor layer is said to be formed directly on a thermoplastic polyimide surface, and the resulting laminate is then heated to "directly thermally fuse" the conductor layer to the polyimide. According to the 169 Specification, the thermoplastic polyimides are preferably prepared by dehydrocyclization of polyamic acids of general formula (I),



(I)

(Spec. 8.) The conductor layer can be formed by processes such as "dry plating" methods, including sputtering, evaporation, and so forth. (Spec. 11.) The heating temperature is not particularly specified, but temperatures 30°C or more than the glass transition temperature of the thermoplastic polyimide is preferred "since a heat fusion effect can be achieved in such a case." (Spec. 13.) The upper temperature limit is said to be set by the level of acceptable oxidation of the copper [conductive] layer. (*Id.*) The heating is preferably carried out at a pressure of 2 MPa [20 atm] or more, for a period of e.g., 30 minutes. (*Id.*)

The Examiner has maintained the following grounds of rejection:[4]

A. Claims 1-9, 13, and 17-20 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of either Chen[5] or Shiotani[6] and Oizumi.[7]

B. Claims 1, 3-11, 13, and 17-20 stand rejected under 35 U.S.C. § 103(a) in view of the combined teachings of either Kuromaru[8] or Yamaguchi[9] and Oizumi.

C. Claim 12 stands rejected under 35 U.S.C. § 103(a) in view of the combined teachings of either Kuromaru, Chen, Shiotani, or Yamaguchi with Oizumi and Ameen.[10]

All of the Examiner's rejections rely on Oizumi for a teaching of heating the metal-polyimide laminate with the "expectation of achieving a superior bond between the polyimide and the metal layers." (FR 3, first and last paragraphs; FR 4-5.)

The dispositive issue is whether, as Hara argues, Oizumi (cited in the Brief as "JP '966") "does not teach any enhancement of adhesion." (Br. 21.)

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[4] Examiner's Answer mailed 8 July 2009. ("Ans.").

[5] Pei C. Chen et al., *Method of Laminating Polyimide to Thin Sheet Metal*, U.S. Patent 5,156,710 (1992).

[6] Akinori Shiotani et al., *Polyimide/Metal Composite Sheet*, U.S. Patent 5,741,598 (1998).

[7] Masayuki Oizumi et al., *Manufacture of Composite Sheet*, JP 54-066966 A (1979). The USPTO translation is of record.

[8] JP 62-60640 A, *Laminate of Metal and Resin* (1987). The translation submitted by Hara on 9 January 2004. The Abstract cited by the Examiner is not in the official file of the USPTO.

[9] Hiroaki Yamaguchi et al., *Laminate of Heat-Resistant Film Improved in Adhesion*, JP 11-240106 A (1999). The USPTO translation is of record.

[10] Thomas J. Ameen et al., *Method for Forming Printed Circuits*, U.S. Patent 5,681,443 (1997).

Hara continues, "[t]he mere fact that [Oizumi] may not mention a reduction in adhesion strength in some sections does not mean that [Oizumi] would be considered to describe that adhesion strength is enhanced." (*Id.*)

C. Discussion

As the Appellant, Hara bears the procedural burden of showing harmful error in the Examiner's rejections. *See, e.g., In re Kahn*, 441 F.3d 977, 985-86 (Fed. Cir. 2006) ("On appeal to the Board, an applicant can overcome a rejection [under § 103] by showing insufficient evidence of *prima facie* obviousness") (citation and internal quote omitted).

Oizumi describes a method designed to obtain flexible printed circuit boards comprising a metal foil, such as copper, and a plastic layer, such as thermoplastic polyimide, that do not curl upon cooling from the drying and curing temperature to room temperature. (Oizumi 7-8, ¶ [0011]; 8-9, ¶ [0015].) Oizumi adds, "[f]or a composite film made of polyimide and a metal foil, higher point in the specified temperature range produces a better result because its glass transfer temperature is higher than polyamideimide, which is easy to understand." (*Id.* at 9, ¶ [0016].) Although Oizumi reports that conducting this "maturation" procedure in the open air may result in copper discoloration and minor adhesion degradation, Oizumi also reports that conducting the maturation in an inert atmosphere or vacuum prevents this "inconvenience." (*Id.* at 9-10, ¶ [0017].)

Oizumi does not teach any increase in bonding strength between the metal and the thermoplastic polyimide. Moreover, it is clear that Oizumi is teaching a method of annealing the macromolecular chains that results in a

decrease in mechanical stress that leads to curling of the laminate. The Examiner has not come forward with any credible evidence or technical reason that a person having ordinary skill in the art would have had a reasonable expectation of achieving a superior bond between the polyimide and the metal layers by heating the laminate in accordance with the teachings of Oizumi.

C. Order

We REVERSE the rejection of claims 1-9, 13, and 17-20 under 35 U.S.C. § 103(a) in view of the combined teachings of either Chen or Shiotani and Oizumi.

We REVERSE the rejection of claims 1, 3-11, 13, and 17-20 under 35 U.S.C. § 103(a) in view of the combined teachings of either Kuromaru or Yamaguchi and Oizumi.

We REVERSE the rejection of claim 2 under 35 U.S.C. § 103(a) in view of the combined teachings of any of Kuromaru, Chen, Shiotani. or Yamaguchi with Oizumi and Ameen.

REVERSED

tc

WESTERMAN, HATTORI, DANIELS & ADRIAN, LLP
1250 CONNECTICUT AVENUE, NW
SUITE 700
WASHINGTON, DC 20036